Cleanawater Packaged Pump Stations – Sewer / Stormwater

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Installation, Operations & Maintenance Manual

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Sustainability Innovation Service

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INTRODUCTION

Congratulations on your purchase of a Packaged Pump Station. With proper care and by following a few simple guidelines your system will give you many years of dependable service.

IMPORTANT

Only qualified personnel should install, operate and repair your pump stations system. Any wiring of pumps should be performed by a qualified electrician.

Before installation local authorities must be consulted for all applicable codes and regulations.

SAFETY PRECAUTIONS

1. Ensure installer is aware of "Confined Spaces" guidelines.
2. Make sure that there is sufficient oxygen and that there are no poisonous gases present.
3. Check the explosion risk before welding or using electric hand tools.
4. Do not ignore health hazards. Observe strict cleanliness.
5. Ensure that the lifting equipment (where required) is in good condition.
6. All personnel who are to work with sewage systems should be vaccinated against diseases that can occur.
7. Keep a first aid kit handy.

PRIOR TO INSTALLATION – INSTALLER'S CHECKLIST

Before installing the pump station, check the depth of the inlet pipe as this will determine the tank depth. (See tank inlet specification.)

CAUTION:

- **Installation should be carried out by experienced and qualified tradesmen.**
- **Before digging call any relevant local authorities to locate any underground lines or cables.**
- **The installation of a pump station requires the prior approval of local authorities. Questions relating to this should be directed to a responsible officer of local council and/or other relevant authority. We regret we are unable to supply this information.**

The following information must be regarded as a guide only and is to be read in conjunction with printed detail sheet for the particular tank installation proposed.

1. (a) Determine the best location for your tank, and control panel (if applicable).

   (b) Correct appraisal of site conditions is essential before installation of sewage and stormwater tanks. Installers must recognise that these tanks when empty will float on approximately 50mm of water. The upward thrust at the base of the tank fully immersed in water could exceed 69 000 KPA.

   Close attention to site conditions is therefore necessary.

   (c) Consider……

- **Drainage**, particularly at the tank base
- The **rise in water** due to
  - (i) tidal conditions
  - (ii) saturation of the ground during heavy rain
  - (iii) likelihood of flooding or run-off water from any source
- The quality of available **backfill**

(d) Where tanks are installed under adverse site conditions, the utmost care is required to prevent any chance of the vessel being forced out of the ground by upward pressure of the water. This can occur if the base is not properly drained.

(e) For installations where the water table is above the bottom of the tank it is recommended that the tanks be bedded on a cement slurry (see Installation Procedure). This will prevent the base of the tank buckling.

2. Check for any damage to tanks. During transport and handling over rough ground, be careful to avoid "bruising". Contact with sharp stones or dropping of the tank may result in fractures, which must be repaired before installation to prevent leakage through the tank wall. Refer to supplier.
3. Minimise the use of elbows on the inlet line. If required, use only 45° elbows.
4. Plan your installation location carefully to ensure that the inlet pipe stays within the allowable inlet height.
5. Determine where the incoming power will be supplied from and if it can handle the rated load for your pump station.
6. Mount the control panel, when applicable, in accordance with electrical codes and where the alarm light can be easily seen.
7. Make sure you have all the necessary equipment and supplied before starting your installation.
8. Determine the length of electrical cable required as all joints in cables must be made by approved submersible splice. Only extend cables with cable of equal or greater submersion rating and current carrying capacity.
9. Finish ground level in relation to tank lid, as tank lid risers are not normally recommended. Also, lids must not be buried at any time.
10. **Ensure tank lid or grate/frame has clearance of 70mm from the top lip of the pumping station chamber. Contractors should box this area up accordingly prior to stabilized sand/concreting. This will ensure that any silt basket (if supplied) which sits in the grate will have adequate clearance.**

PROCEDURE FOR INSTALLATION

See "Typical Installation", Page 8

1. The hole for the tank should be no greater than 250 to 300mm oversize to tank diameter, with due regard to the amount of concrete or backfill to be used under and around the tank.
2. It is suggested the base of the tank be drained, especially in water charged ground, before, during and until concrete encasement has set, to hold the tank securely in the ground.
3. Lay minimum of 100mm of 20mpa concrete in bottom of hole.
4. Lower tank into hole, while concrete is still a slurry. Ensure no rocks or sharp objects fall into hole as damage to the tank wall and base could occur.
5. Where locking holes are provided in the base of the tank, fit reo bar so it penetrates the concrete slurry to stop the tank base moving.
6. Level and adjust tank to suit installation conditions.
7. Fill tank with water up to the first rib or at least 300-400mm depth.
8. Secure tank with stabilizing bars or timbers to hold in place before encasing with concrete.
9. Put pumps into tank and connect unions (where fitted) before installing discharge line, to make sure connections are free and level.
10. The tanks are provided with a collar approximately 300mm from the base. The purpose of this collar is to create a bond between the tanks and the backfill material to withstand the upward forces when the tanks are empty.
11. Check local council and other authority's requirements concerning levels. Ensure you have relevant inspector's approval before backfilling commences.
12. Whilst site conditions will determine the amount of concrete encasement, you should refer to engineer's instructions for each individual site.
13. Backfill material must not exceed 100mm to underside of lid when fitted with gatic type concrete in-fill lid.
14. When backfilling use sand or soil only. At all times be careful that rocky or sharp objects are not used. Avoid use of heavy soils that do not consolidate.
15. Inlet pipes must be vented.
16. Inlet pipes must be fitted with a "T" junction and dropper pipe on the inside of tank.
17. All pipe connections to tanks must be flanged and sealed to stop water and dirt ingress.

18. Minimum inlet height from base of tank to the underside of pipe would be 600mm.

AFTER INSTALLATION

1. Ensure that the tank is protected from accidental contact by motor vehicles, construction or farm equipment, or wandering livestock.
2. Where there is danger of stock being able to walk on the lid, the tank must be fenced to prevent the risk of the lid being holed, or injury to livestock. Alternatively, a specifically constructed lid able to withstand the required traffic can be supplied; it is preferable for this to be specified prior to installation.

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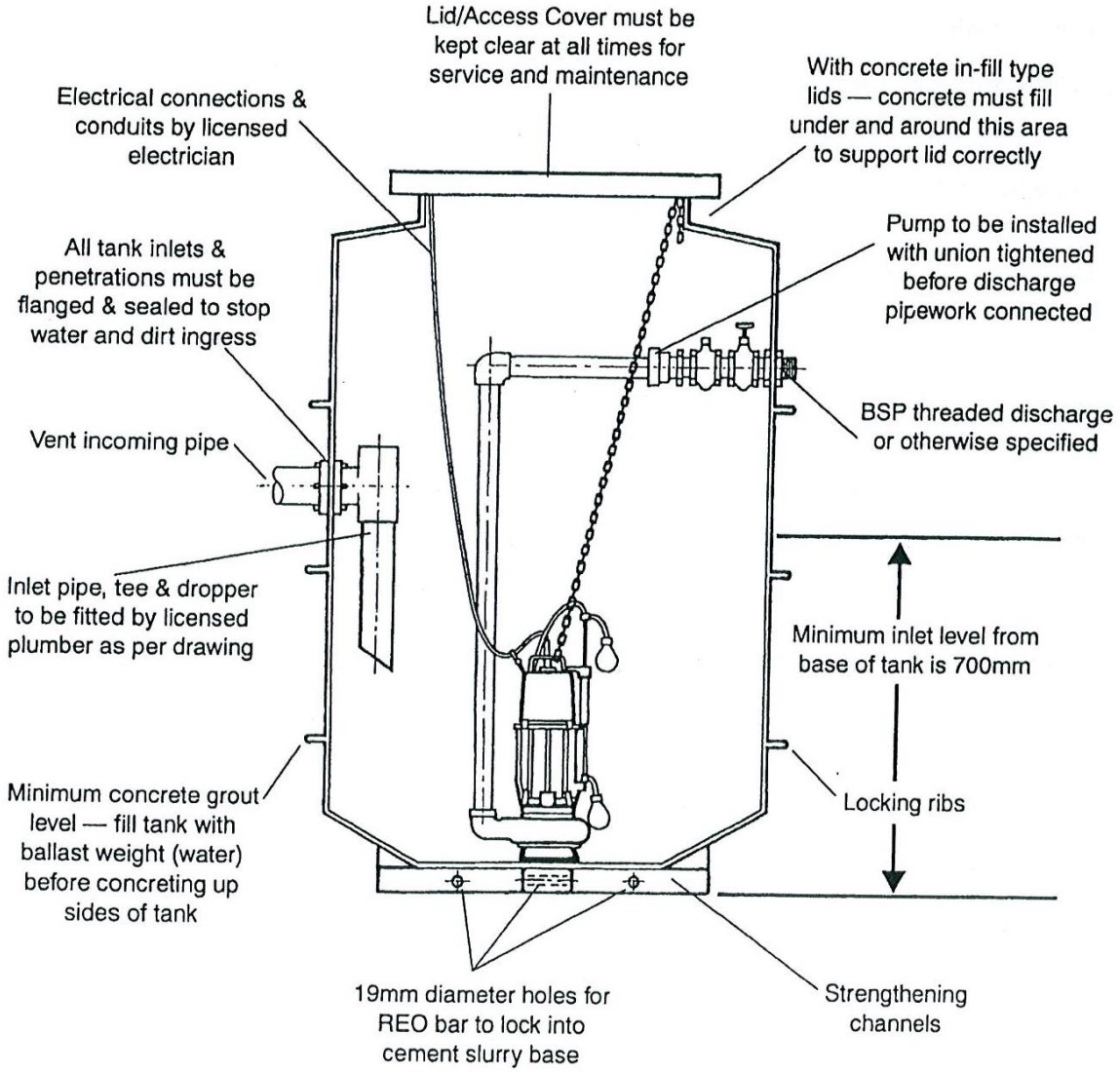
TYPICAL INSTALLATION DRAWING

(Shown – 1200 Ltr Tank with single Submersible Pump)

Installation procedures may vary from site to site and with different model tanks and pumps.

Please read installation instructions carefully. If in doubt please refer to Engineers Department.



SAFETY PRECAUTIONS – USE, CARE AND OPERATION FOR PACKAGED PUMP STATION

Your wastewater disposal service is part of a low pressure sewer system (for sewer pumping stations). The key element in this system is the packaged pump station. The tank collects all wastewater; solids in the sewage/trade waste/effluent are then ground into a slurry, suitable for pumping. The pump generates sufficient pressure to pump this slurry to the sewer main.

Point to remember:

- Minimise the amount of cooking grease entering the system.
- Regulatory agencies advise that the following items should not be introduced into any sewer, either directly or through a pumping station:

  - glass
  - metal
  - baby napkins
  - socks, rags or cloth
  - plastic objects (eg toys, utensils etc)
  - sanitary napkins or tampons

In addition you must **NEVER** introduce into any sewer

  - explosives
  - flammable material
  - lubricating oil and/or grease
  - strong chemicals
  - petrol or gasoline

- Do not leave pump cover off the tank except when servicing, to prevent the entrance of foreign materials such as rocks, metal, soil, animals or humans.
- Prevent infiltration or direct flow of rain or run-off water into the pump basin to minimise pump cycling. This will prevent overloading the treatment facility and will facilitate swift transportation of waste/sewage/effluent.
- To reduce the risk of electrical shock, pumps and control panels must be properly earthed in accordance with AS3000 wiring rules and all applicable state or local council ordinances.
- During power blackouts, minimise water consumption in the building to prevent sewage backing up.

- Always keep the shut-off valve completely open when system is in operation (unless advised otherwise by proper authorities). Before removing the pump from the station be sure to close the shut-off valve. (This prevents backflow from the pressure sewer.)
- Keep the control panel (if installed) locked or confined to prevent unauthorised access.
- If the pump is idle for long periods of time, it is advisable to start the pump occasionally by adding water to the tank

BREAKDOWN – SAFETY WHEN SERVICING

- Be aware of "Confined Spaces" guidelines.
- To reduce the risk of electrical shock, always disconnect the pump from the power source before handling or servicing. Lock out power and tag.
- Do not wear loose clothing that may become entangles in the impeller or other moving parts.
- Keep clear of suction and discharge openings. DO NOT insert fingers in pump whilst power is connected.
- Always wear appropriate safety gear such as safety glasses when working on the pump or piping.
- Cable should be protected at all times to avoid punctures, cuts, bruises and abrasions. INSPECT FREQUENTLY.
- Never handle connected power cords with wet hands.
- To reduce the risk of electrical shock, all wiring and junction connections should be made in accordance with local codes and regulations.

THIS SECTION CONTAINS IMPORTANT SAFETY AND WARRANTY INFORMATION ABOUT YOUR PUMP. PLEASE READ IT CAREFULLY BEFORE INSTALLATION OR OPERATION. PLEASE ALSO ENSURE THAT ALL REVANT PARTIES RECEIVE A COPY.

WARNING

1. Only qualified and competent tradespeople should attempt installation or other work on your submersible pump and its associated equipment.
2. All necessary care should be taken to avoid electric shock. Do not work on or touch your electric submersible pump, or anything in electrical contact with it (e.g. water in pit), unless the system has first been electrically isolated.
3. Do not enter pit without all necessary safety equipment for confined spaces.
4. Do not leave open pit unattended or unbarricaded.
5. Incorrect operation or application of your submersible pump could cause personal injury or damage to the pump.

TAKING DELIVERY OR YOUR SUBMERSIBLE PUMP

1. PLEASE ENSURE ALL PARTS ORDERED/REQUESTED HAVE BEEN DELIVERED AND DELIVERY PAPERWORK AND INSTRUCTION MANUALS ARE COMPLETE.
2. INSPECT PUMPS AND EQUIPMENT FOR ANY SIGNS OF DAMAGE.
3. TAKE NOTICE OF ANY WARNING STICKERS/LABELS

STORAGE

1. STORE YOUR EQUIPMENT SECURELY IN AN AREA PROTECTED FROM DAMAGE BY VANDALS, WEATHER, OR OTHER CONSTRUCTION PERSONS OR EQUIPMENT.
2. AVOID LONG-TERM STORAGE OF THE PUMPS IN THE PIT DURING CONSTRUCTION PERIOD OR PRIOR TO COMMISSIONING.
3. DO NOT ALLOW ELECTRICAL LEADS TO BECOME IMMERSED IN WATER.

INSTALLATION

THE INSTALLATION OF YOUR PUMPING EQUIPMENT MUST ONLY BE CARRIED OUT BY SUITABLY QUALIFIED AND COMPETENT TRADESPERSONS.

BEFORE BEGINNING INSTALLATION PROCEDURES, THESE INSTALLATION AND OPERATING INSTRUCTIONS SHOULD BE STUDIED CAREFULLY, THE INSTALLATION SHOULD ALSO BE ACCORDANCE WITH LOCAL REGULATIONS AND ACCEPTED CODES OF GOOD PRACTICE.

PITS AND TANKS

For tanks and pits supplied as part of your package, please refer to the Packaged Pump Station manual supplied.

In general, the pit should be dimensioned according to the relation between the water flow into the pit and the pump and capacity. Also, consideration should be made of the physical dimensions of the pump and enough room allowed for any control gear; float switches etc., to operate freely when determining both the pit depth and area.

The pit walls, floor and ceiling must be constructed of a suitably solid material or designed to prevent silt, mud, rock or other foreign objects from entering the pit.

Pit lids and grates must also be designed to prevent entry of silt, mud, rocks or other foreign objects.

Be sure to provide adequate access to the pumps and their associated valves etc.

Pits with sealed or gas-tight lids must be adequately vented by a dedicated vent pipe direct to the tank.

PUMP POSITIONING

The pump should be mounted on a firm solid surface away from inlet pipes etc., and if possible, elevated by 100mm from the base of the pit. Do not hang pump from discharge pipework, lifting chain or electrical cable.

Secure the pump with a lifting chain or other suitable means to the top of the pit at the manhole to prevent pump from tipping over or "walking" on pit floor and to provide a means of lifting the pump out of the pit. **N.B. The pump should never be lifted by the electrical cable**.

Allow enough free cable in pit to enable pump to be lifted out of the manhole without electrical disconnection. This free cable should be coiled neatly and attached to the lifting chain at the top of the pit.

N.B. The pit should be cleaned totally of silt, mud and other foreign objects prior to pump installation and be kept clean following this (see **Care and Maintenance**.)

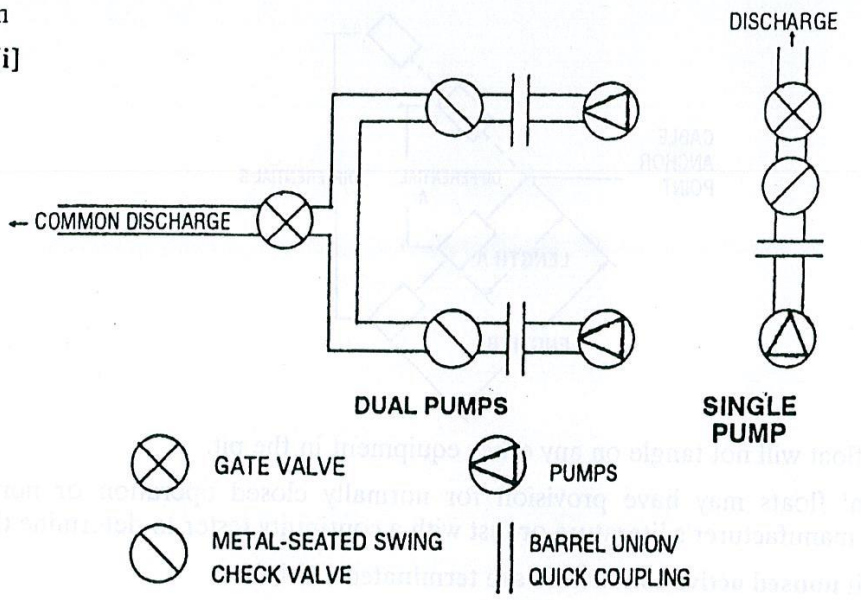
PIPEWORK

Rigid PVC pipework (minimum Class 9 pressure pipe) should be used in preference to flexible hose. Non pressure-rated pipe or hose should not be used.

An isolating valve must be provided in the common discharge line and a metal-seated swing check valve and barrel union/quick coupling must be provided on each individual pump discharge line before connection to the common discharge line (see **Figure [i]**).

Diagram

Figure [i]



The valves and unions must be located as close as practical to the top of the pit at the manhole.

Pipe size should generally be calculated by system flow rate and length of run employing accepted methods and principles. However, pipework should be at least the same size as pump discharge connection.

PUMP CONTROLS

GENERAL:

Care should be taken to ensure that the adjustment of the float level controls is correct. Cycling (excessive starting and stopping) and dry-running void warranty.

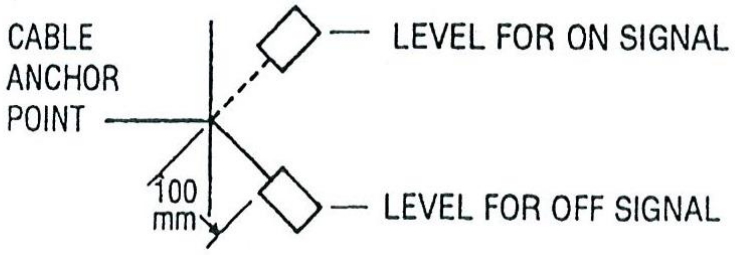
FLOAT SWITCH TYPES:

Differential: These float switches operate when tilted at approximately 45° up or down. They can be used as direct on-line controls for single phase up to 10 amps or as signal controls.

For use as signal controls, differential floats should be anchored approximately 100mm from the float head as shown in **Figure [ii]**.

Diagram

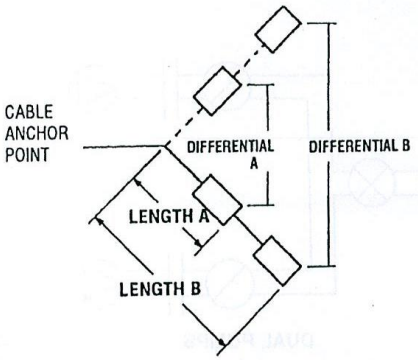
Figure [ii]



Be careful to position the float switch according to whether it is to provide an "On" signal or an "Off" signal. For use as direct on-line or differential control, the length of cable from the head to the anchor point determines the depth of the differential (see **Figure [iii]**.)

Diagram

Figure [iii]



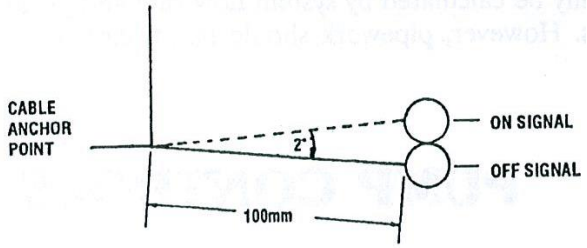
Ensure that the float will not tangle on any other equipment in the pit.

Some differential floats may have provision for normally closed operation or normally open operation. Read manufacturer's literature or test with a continuity tester to determine this.

**** Ensure that all unused active conductors are terminated safely****

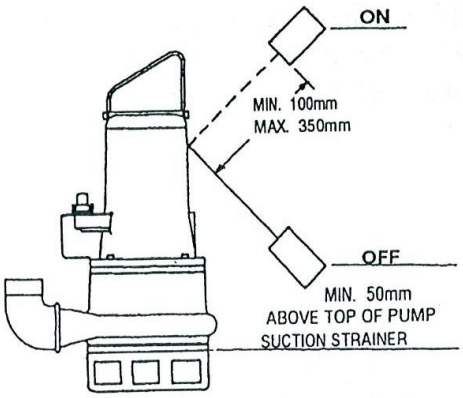
CR Type: These float switches are only used as signal controls. They work on a differential of 2° and therefore should be anchored at the position of the required signal (see **Figure [iv]**.)

Diagram
Figure [iv]



Single Pump Integrated Float Switch: Ensure that the float switch cable is attached to the pump by the clip/bracket provided. The float switch should be adjusted as per the manufacturer's specification. However, a standard arrangement is show in **Figure[v]** as a guide.

Diagram
Figure [v]



Single Pump, Separate Float Switch: The float switch should be free to move as for integrated float switch and adjusted similarly with the addition that, where a mounting clip/bracket is not provided, the float switch cable should be anchored securely by cable tie or similar at the pivot point to the discharge pipework, body of the pump or other similar suitable anchoring point. Consideration should be made for the ease of removal of the float switch from the pit for inspection in the case of the pit flooding.

Excess cables should be coiled neatly and attached to a suitable point at the manhole.

DUAL PUMP KITS:

For installers supplying their own control gear or connecting pumps to original control gear:

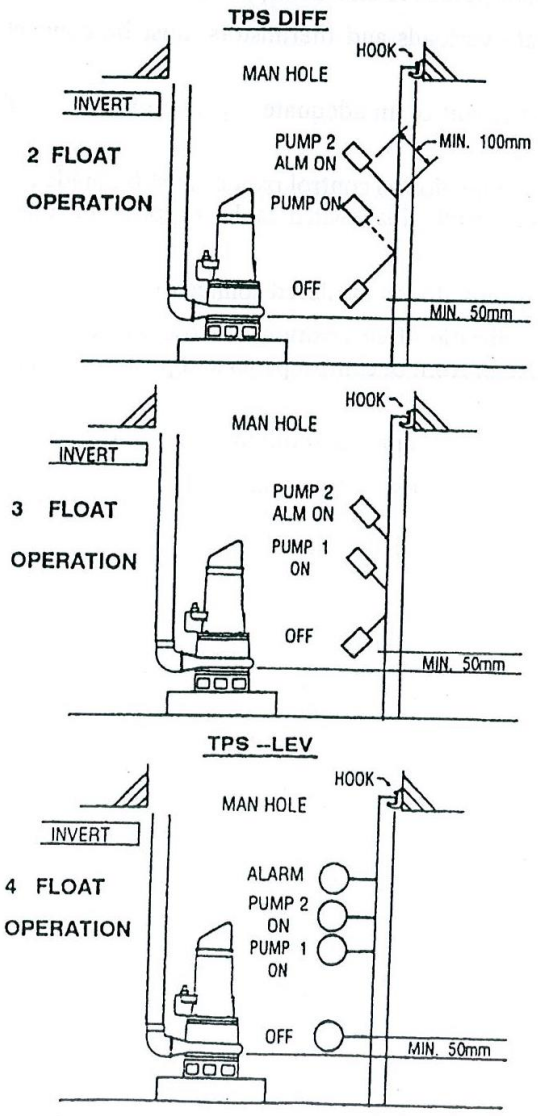
It is your own responsibility to ensure that the control gear is suitably set up to protect the pumps from cycling and dry-running.

Generally, dual pump kits supplied with standard control gear are provided complete with float switches mounted in a conduit or bracket manufactured to the approximate dimensions supplied. This float set should be checked for accuracy of dimensions and float switch adjustment and adjusted as necessary (see **Figure [vi]**.)

Mount the conduit on a hook or similar bracket at the manhole ensuring that the conduit is held securely but is easily removable from the pit as a complete unit for maintenance. Be careful to position the float set away from obstructions to allow free movement of the float switches. Allow enough loose cable in the pit for the float set to be completely removed from the pit manhole. Coil this neatly and attach at the manhole.

Warning: Do not allow the liquid level to drop below the suction inlet of the pump. Dry-running voids Warranty.

Diagram
Figure [vi]



ELECTRICAL CONNECTION

ELECTRICAL WORK MUST ONLY BE PERFORMED BY QUALIFIED AND COMPETENT PERSONNEL.

ELECTRICAL CONNECTION SHOULD BE CARRIED OUT IN ACCORDANCE WITH LOCAL REGULATIONS.

READ ALL WIRING DIAGRAMS AND INSTRUCTION SHEETS SUPPLIED BEFORE ATTEMPTING ELECTRICAL CONNECTION. IF IN DOUBT, CONTACT US FOR ADVICE AND COPIES OF WIRING DIAGRAMS OR INSTRUCTION SHEETS.

SUPPLY: Ensure available power supply complies with electrical data on pump and control panel nameplates.

Power should be supplied via a main isolating switch. If the pump is not installed close to the switch it must be of a lockable type.

Three-phase pumps must be connected through a hand-resettable thermal overload (generally incorporated into standard control panels).

It is advisable for single-phase pumps to also be supplied via a hand-resettable thermal overload.

All internally fitted thermal overloads and thermistors must be connect as per manufacturers' instructions.

A clearly-marked dedicated circuit of an adequate capacity must be used. Pay careful attention to voltage drop regulations.

CONTROL PANELS: Connection to control panels must be made as per instruction sheets and wiring diagrams supplied. Generally float switch cables supplied in conduit as a set are marked by tags on the end of the cable.

All unused wires are to be terminated in insulated connectors.

Mount control panels in a vibration-free position as close as practical to the pit. Allow at least 1m x 1m clear-standing space in front of control panel and position well away from possible damage by vehicles/machinery etc.

Thermal overloads fitted should be adjusted to full load amps noted on pump nameplate.

For three-phase pumps, check direction of rotation. Correct rotation is clockwise, looking down on top of pump. Swap any two phases to change rotation. To visually inspect direction of impeller rotation, it may be necessary to remove the suction strainer.

Keep clear of unprotected impeller.

CONDUITS: All wiring from control panel to pit must be in approved conduit or trunking.

Conduits from pit to control panel must be adequately sized with a minimum amount of bends to allow easy insertion/withdrawal or wires. Minimum 2 x 32mm or 1 x 50mm conduit with long radius bends is standard procedure for dual systems to 1.5kw.

All conduits entering control panel must be sealed internally with silicon or similar to prevent ingress of moisture or fumes from pit.

CABLES: DO NOT ALLOW CABLE ENDS TO BE SUBMERSED.

Joints in cables must be made by an approved submersible splice. Only extend cables with cable of equal or greater submersion rating and current carrying capacity.

Leave enough slack cable in pit to allow easy and complete removal of equipment from pit. Ensure that this loose cable is secured at the pit manhole to prevent float switch fouling or entry into pump impeller

COMMISSIONING

GENERAL COMMISSION PROCEDURE

1. Double-check all aspects and details covered by this booklet.
2. Check all electrical connections are complete and correct.
3. Check adequacy of power supply. Switch on all isolating switches.
4. Double-check pump rotation (three-phase only).
5. Check amp draw of motors. Compare to pump nameplate details.
6. Ensure pit is clear of silt, mud, building debris and other foreign objects.
7. Double-check thermal overload setting.
8. Run through complete system operation ensuring that the pumps switch off before running dry or sucking air.
9. Return all selector switches to Auto position.

OPERATION

In general, with correct control settings, your submersible pump system should operate automatically.

Do not allow anything to enter the system pipework or pit which the pump is not designed to pump.

STORMWATER/SUBSOIL DRAINAGE PUMPS

Unless otherwise specified in writing, these pumps are only designed to pump slightly silty water – not leaves, twigs, large quantities of mud, gravel or other foreign objects.

SEWAGE PUMPS

These pumps are only designed to pump liquids and soft solids classified as normal sewage. Under no circumstances should articles of clothing, sanitary items, rags and other foreign objects be allowed to enter the system pipework or pit.

Make sure regular maintenance is carried out on the entire system.

TROUBLE-SHOOTING GUIDE

Pump Motor does not run

1. Water level in pit below off float level.
2. Power failure – check isolating switches and circuit breakers or fuses.
3. Thermal motor protection set too low – adjust and reset.
4. Loose terminal connection.
5. Float Switch movement obstructed.

Motor trips circuit breakers or thermal overload after short time of operation

1. Temperature of pumped liquid too high.
2. Impeller jammed or partly jammed by foreign objects.
3. Phase failure.
4. Voltage too low.
5. Thermal overload set too low.
6. Impeller corroded to coverplate from lack of use or moisture entry during storage.

Pump runs but does not pump

1. Gate valve closed.
2. Suction strainer or discharge line blocked.
3. Pump too small for application.
4. Incorrect direction of rotation.
5. Air lock in pump – check that pump does not suck air before switching off. Vent discharge line below check valve.

Pump will not switch off after emptying tank

1. Off float switch adjusted too low.
2. Incorrect wiring.
3. Float switch fused.
4. Off float switch movement obstructed.

Repeated banging sound after pump switches off or tank continues emptying after pump switches off

1. Discharge line syphoning – check that discharge point is not lower than pump.

CARE AND MAINTENANCE

ONLY QUALIFIED AND COMPETENT PERSONNEL SHOULD ATTEMPT TO CARRY OUT MAINTENANCE WORKS ON YOUR SUBMERSIBLE PUMP SYSTEM.

Installation conditions will determine regularity of maintenance intervals. However, all installations should be serviced once every six months. More regular servicing is required for applications where there are abrasive particles in the water, excessive silt or debris entering the pit, or where the pumps are subject to heavy usage.

It is a good idea to keep a close eye on your newly-installed system until the time of the first maintenance service, to determine if more regular servicing is required.

Particular care should be taken to keep the pit clean while construction works are in progress.

MAINTENANCE SCHEDULE: Additional to any requirements in manufacturer's manual –

1. Be careful to avoid electric shock. Isolate pumps and controls before starting work.
2. Check external condition of pumps and control gear.
3. Check pumps for wear.
4. Check condition of electrical equipment.
5. Check pit for sludge build-up/presence of foreign objects – remove if necessary.
6. Check that pump cables are securely tied up and that float switch movement is not obstructed.
7. Check system operation.

WARRANTY

Your Submersible Pump and its associated fittings and equipment supplied are guaranteed to be free from defects in material or workmanship for a period of twelve months from the purchase date, as per our **Terms & Conditions of Sale**. This does not cover incorrect installation or application, or any other circumstances beyond our control. Nor are any consequential damages covered.

The **Warranty** is only redeemable to the original purchaser of the equipment unless authorised otherwise by our service staff and covers only parts and labour associated with repair of the defective item in our workshop; i.e. labour or parts associated with travel to site or removal of pumps from pits is not covered. This is particularly applicable to units installed incorrectly.

Serial No. or Invoice No. must be supplied with all Warranty claims.

Freight and insurance for all goods returned for Warranty inspection must be pre-paid.

Installation, application or operation not in compliance with this booklet or any other information supplied, either verbally or in writing, immediately voids this **Warranty**.

We reserve the right to inspect any Warranty claim before authorising rectification work to be carried out under Warranty. Any item not directly manufactured or imported by us is subject to all warranty conditions of the respective manufacturer or importer and, in most cases, requires inspection by the manufacturer or importer.

Failure to carry out proper maintenance works at suitably regular internals voids this **Warranty**.

This **Warranty** does not cover any pump installed in any situation for which it is not specified in writing unless the pump has been supplied to a written specification.